



The AMD Opteron™ Processor Press Presentation

AMD Opteron™ Processor



- AMD has selected the name “**AMD Opteron**” as the brand name for its new family of multi-way enterprise-class processors for servers and workstations.
- The AMD Opteron™ processor is expected to deliver high-performance server and workstation solutions for today’s demanding enterprise applications—delivering scalability, reliability and compatibility. The AMD Opteron processor can also provide investment protection by running 32-bit applications natively while allowing a seamless transition path through 64-bit extensions, as customers require. Shipments are planned to begin in the first half of 2003.

AMD Opteron™ Processor



- The AMD Opteron™ processor is based on the 8th-generation processor core **which** introduces the industry's first x86-64 microprocessor technology. Other key innovations:
 - Integrated Memory Controller—Designed to remove memory bottleneck by scaling memory bandwidth as more CPUs are added and as CPU frequency increases.
 - HyperTransport™ Technology—Designed to increase overall performance by helping to remove I/O bottlenecks, which improves bandwidth and reduces latency. HyperTransport allows the AMD Opteron processor to be deployed in a scalable 8P platform. HyperTransport technology enables glueless multiprocessing and provides an easy building block approach to system design. HyperTransport allows easy integration of a variety of third-party solutions. See HyperTransport Technology Consortium website for more information - <http://www.hypertransport.org/>
- The AMD Opteron processor is designed to aggressively compete against the Intel Xeon and Itanium processors. The AMD Opteron processor continues AMD's tradition of providing industry leading 32-bit performance, while providing customers with investment protection through 64-bit extensions for seamless migrations.
- Shipments of the AMD Opteron processor are planned to begin in first half of 2003.

AMD Opteron™ Processor Name Derivation



Opteron:

- From L. *optimus*, “best”
- Suggests optimal: in the lead, in front, on top; maximum, the most
- Suggests strong, robust, potent, mighty
- Suggests energetic, dynamic, vigorous, vital; smart, brainy, intelligent
- Fits with AMD’s naming convention (AMD Athlon, AMD Duron); appropriate hierarchical message
- Stable, reliable, important in tone

Opteron:

- ❖ Is the optimal/optimum x86 processor – designed to deliver the highest/best performance
- ❖ Gives you the option (choice/flexibility) to run 32-bit or 64-bit applications, because of compatibility advantage vs. Itanium / Xeon
- ❖ Doesn’t “paint you into a corner” (like Itanium)

AMD Opteron™ Processor Overview



- The AMD Opteron™ processor is a next-generation system architecture which is designed to provide a foundation for market-specific solutions:
 - Workstation (1-2 way), will provide exceptional performance for advanced applications
 - Server (1-8 way), with enterprise-level reliability for mission-critical applications
- Leading-edge, native 32-bit performance
 - Integrated Memory Controller
 - HyperTransport™ technology
- Compelling 64-bit migration strategy providing full 64-bit performance
 - x86-64 Instruction Set Architecture
 - Allows for gradual, seamless migration to 64-bit applications
- Ease of implementation
 - HyperTransport technology
 - Open Standards

AMD-8000™ Series Core Logic



AMD-8151™

HyperTransport™ AGP3.0 Graphics Tunnel

The "AMD-8151" is an AGP3.0-compliant graphics controller offering performance up to AGP-8X. The tunnel function is designed to provide connection capability to other downstream HyperTransport technology devices, allowing greater system flexibility.

Design Features

- 16-bit HyperTransport technology interface (Side A—to CPU) offering up to 6.4GB/s bandwidth
- 8-bit HyperTransport interface (Side B—to system) offering up to 1.6GB/s bandwidth
- Compliant with AGP 3.0 specification signaling, supporting 4X and 8X transfer modes.
- Compliant with AGP 2.0 specification signaling, supporting 1X, 2X and 4X transfer modes.

AMD-8131™

HyperTransport™ PCI-X Tunnel

This high-speed device provides two independent, high-performance PCI-X bus bridges.

Design Features

- 16-bit HyperTransport technology (Side A) offering up to 6.4GB/s bandwidth
- 8-bit HyperTransport (Side B) offering up to 3.2GB/s bandwidth
- 2 PCI-X bridges (A & B) support:
 - PCI-X modes and legacy PCI 2.2 mode
 - 133MHz, 100MHz, 66MHz, and 33MHz transfer rates in PCI-X mode
 - 66MHz and 33MHz PCI 2.2 modes
 - Independent transfer rates and operational modes for each bridge
 - Each bridge supports up to 5 PCI masters
 - Each bridge includes IOAPIC with four redirection registers
 - SHPC-compliant hot plug controller and support

AMD-8111™

HyperTransport™ I/O Hub

Replacing the traditional "Southbridge," this component integrates storage, connectivity, audio, I/O expansion, security & system management into a single device.

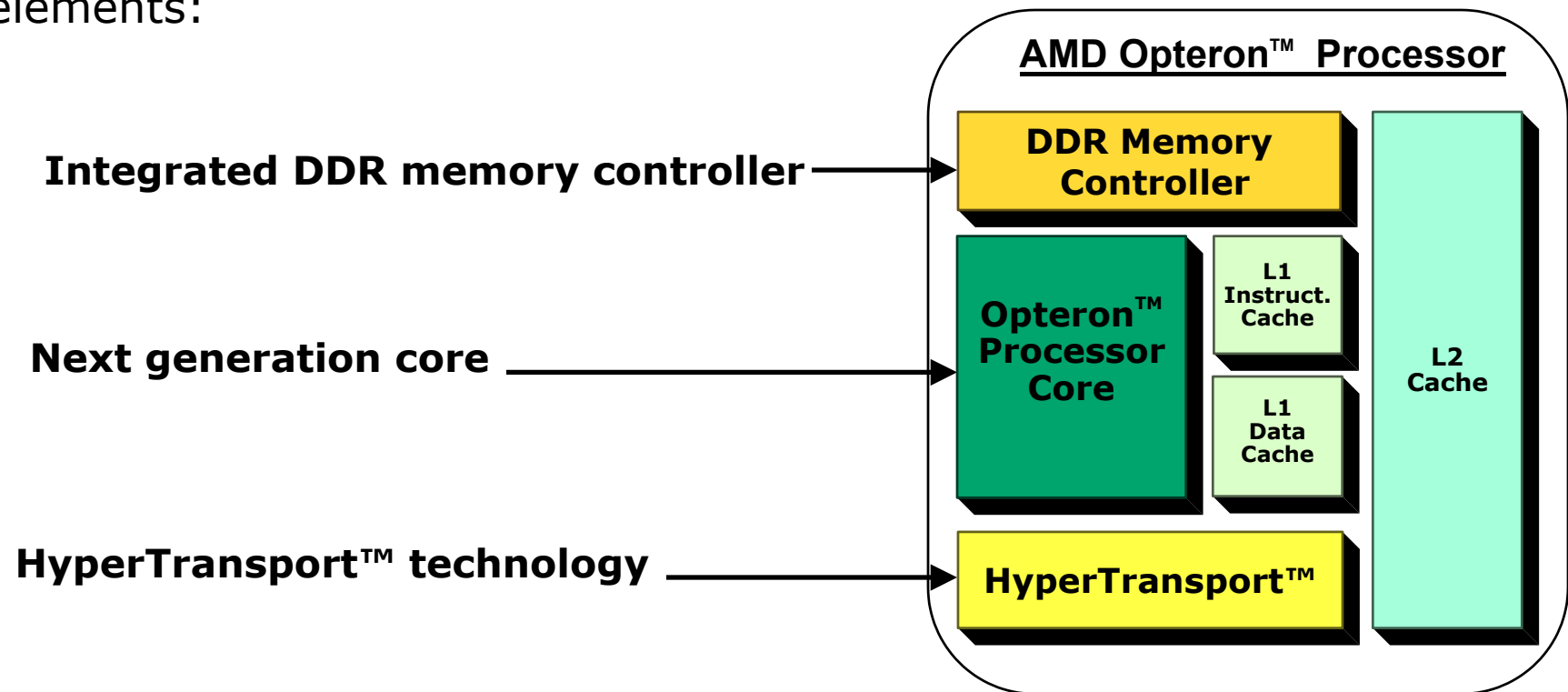
Design Features

- 8-bit HyperTransport technology interface offering up to 800MB/s bandwidth
- 33MHz, 32-bit PCI 2.2-compliant PCI bus supporting up to 8 devices
- AC-97 interface
- Integrated 10/100 Ethernet MAC
- Two USB OHCI and one USB EHCI controller supporting up to 6 ports
- EIDE controller supporting ATA33, 66, 100, and 133 transfer modes
- LPC bus
- High-precision event timer
- Serial IRQ interface
- IOAPIC controller
- Real-time clock

Key Architecture Innovations

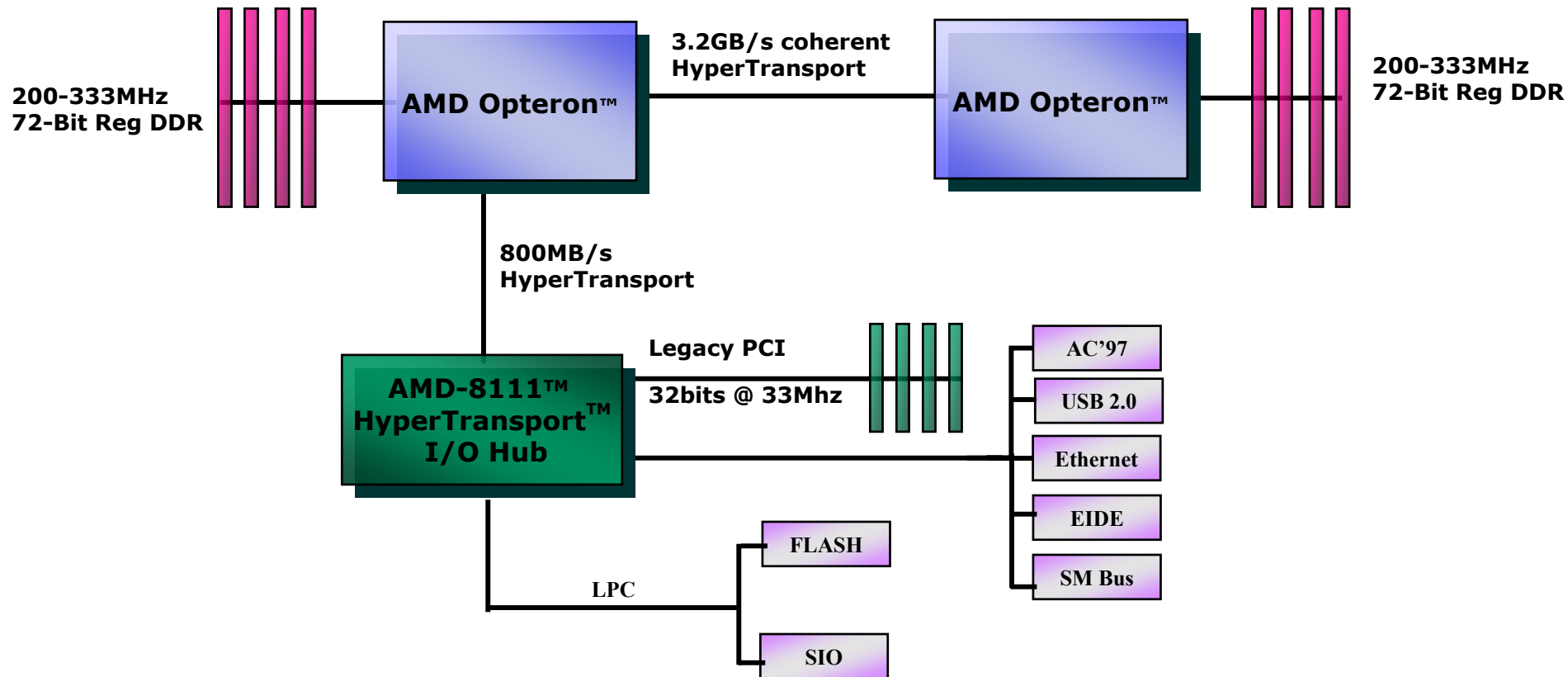


AMD's next-generation Opteron™ processor integrates key system elements:

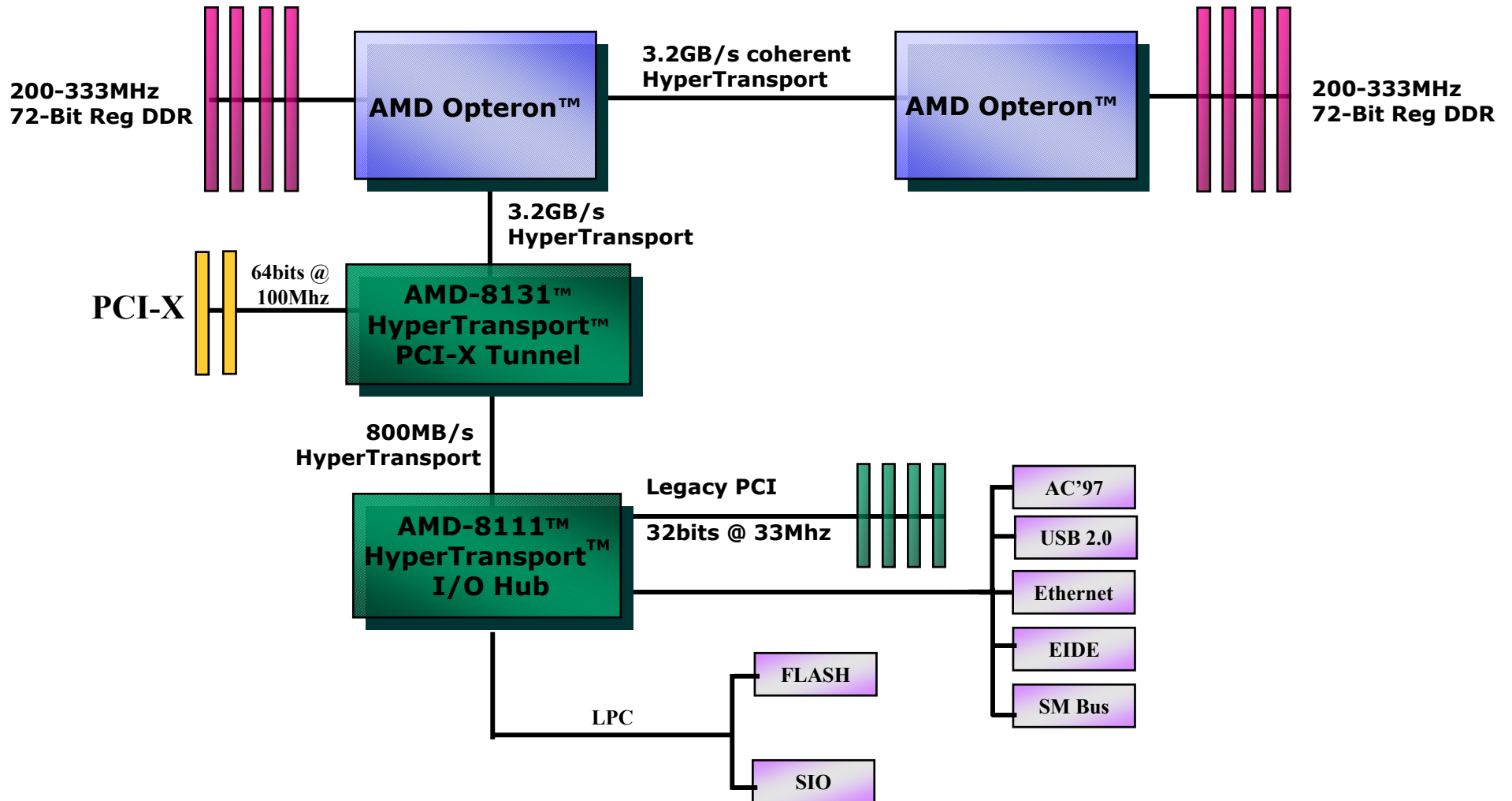


2P Entry Server Implementation **AMD**

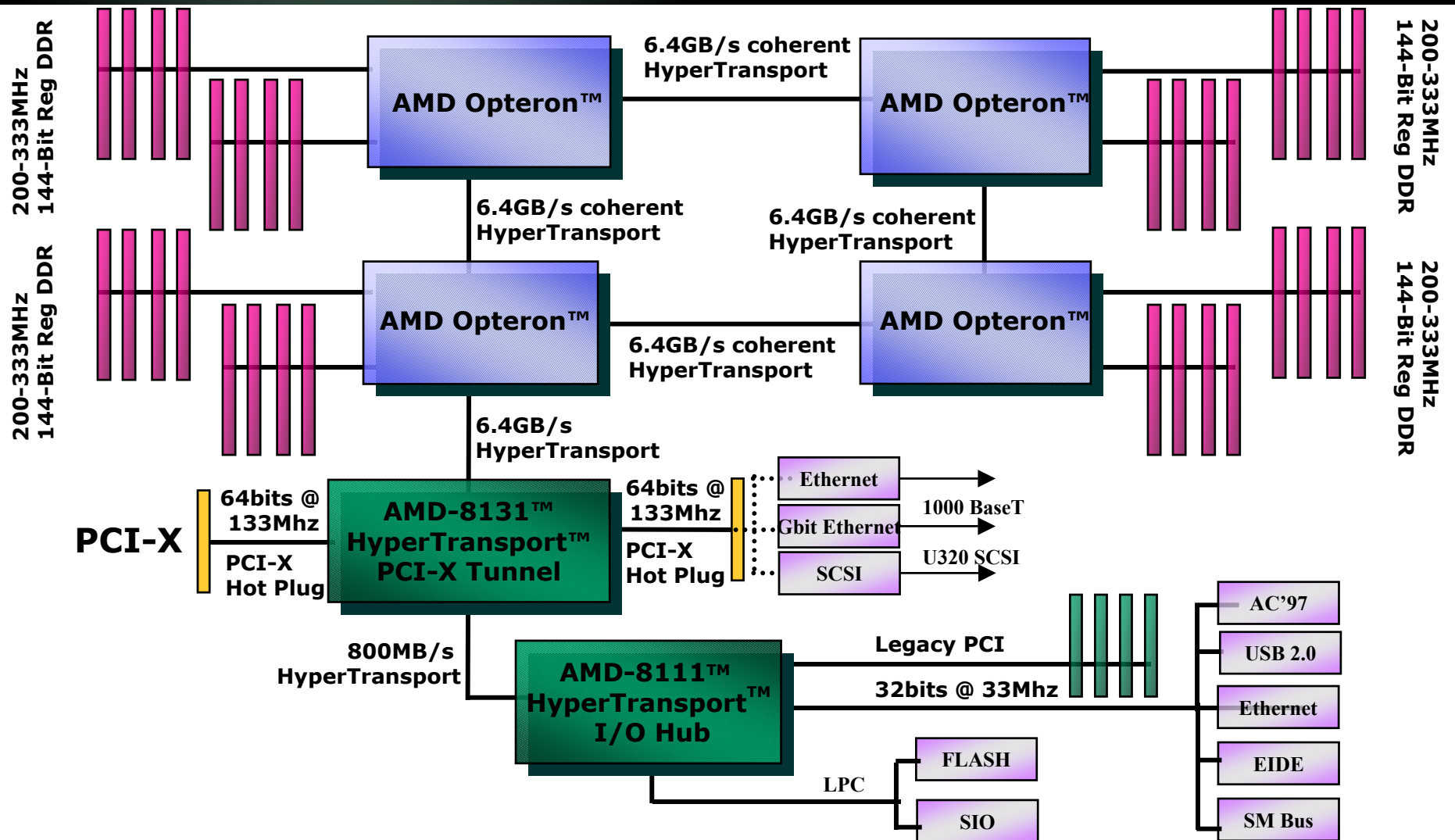
(or server blade implementation)



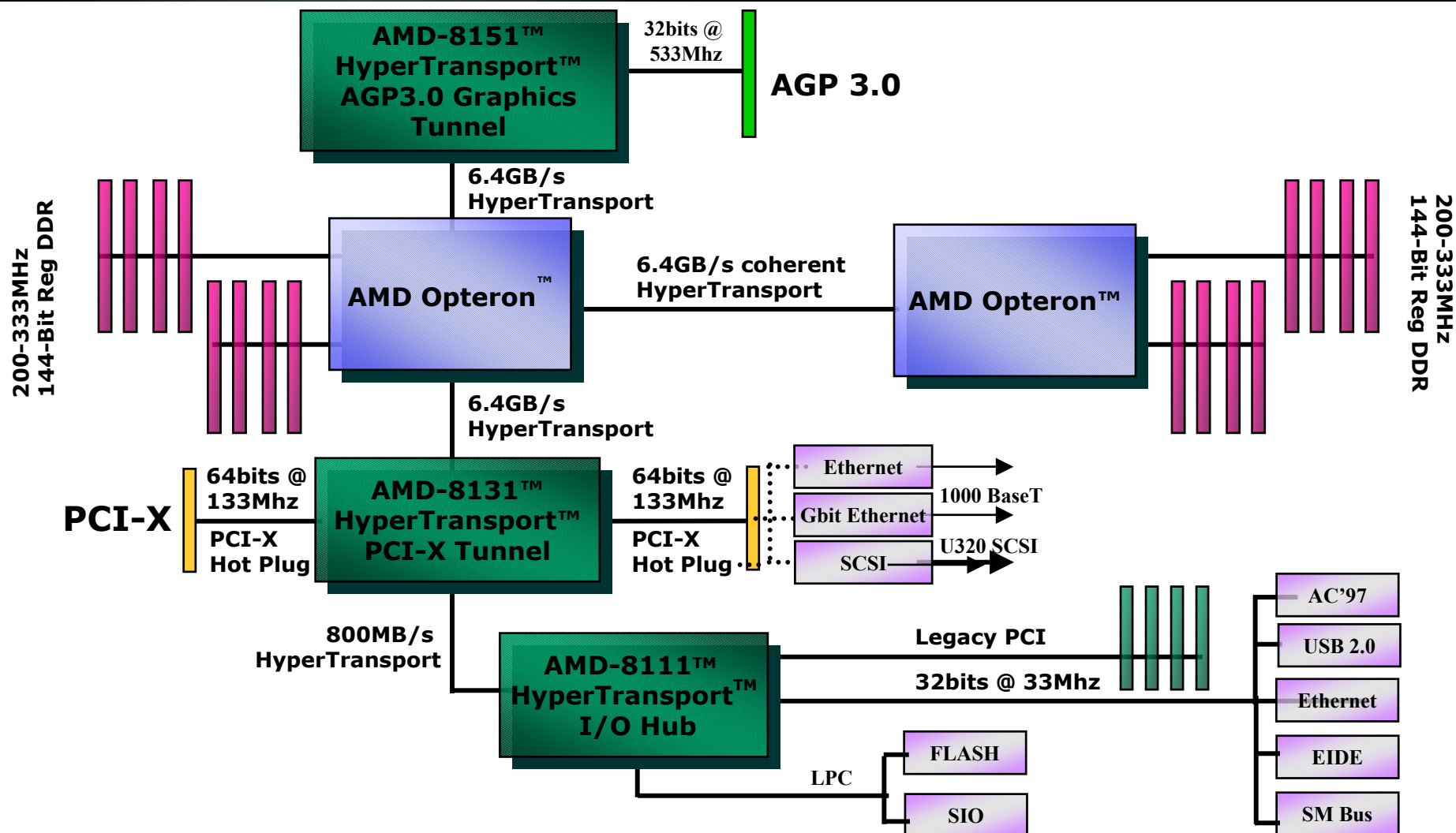
2P Value Server Implementation



4-Way Server Implementation



High-Performance Workstation Implementation



Backup

AMD Opteron™ Processor Server Features & Benefits



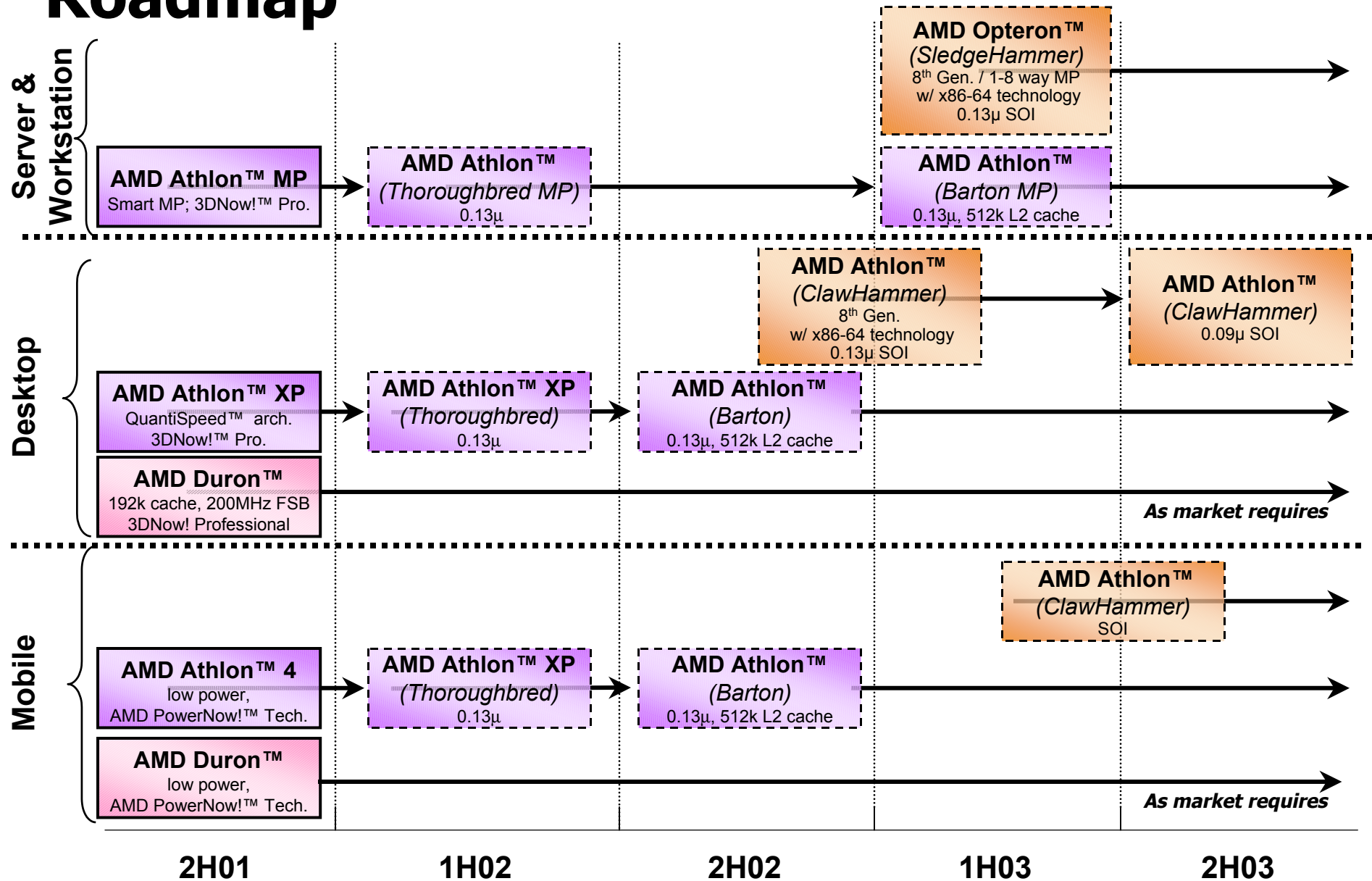
Feature	Benefit
Architecture (Name not yet announced)	With AMD's 8 th generation processor core and new architecture, the AMD Opteron™ processors are designed to achieve an optimum balance between operating frequency and IPC, delivering next-generation performance for your current and future applications. Some enhancements in the architecture, such as ECC protection and parity protection, are designed to help ensure your systems have the stability and reliability you can depend on. <i>(Note: the AMD Opteron processor is planned to provide 20-25% better performance than the AMD Athlon™ processor -- 20% from on-chip low latency memory controller and 5% from improvements on processor core)</i>
Increased L2 Cache Size and Large Workload Features	Up to 1MB of integrated, on-chip L2 cache improves throughput on web server and large dataset applications. Reduced latency L2 TLBs and improved advanced branch prediction helps to increase performance on database, ERP and data mining applications.
x86-64™ Technology	AMD's x86-64 technology is designed to bring customers a compelling 64-bit migration strategy without any significant sacrifice of existing code base. AMD's x86-64 technology is designed to: <ul style="list-style-type: none"> • Provide full speed support for x86 code base, offering high performance levels for your existing 32-bit apps • Allow a seamless 32-bit to 64-bit transition on a "Customer Need" basis • Enable large memory addressing for compute intensive applications, such as database, ERP, decision support, scientific and technical modeling, etc. • Help lower your TCO and network management complexity through a unified architecture for desktop, notebook, workstation and server, and platform flexibility
Integrated DDR Memory Controller	The integration of memory controller functionality into the processor is designed to reduce DRAM latency, and scale memory bandwidth and capacity as the number of CPUs increases – improve performance on compute intensive server applications. Dual channel DDR memory interface on the AMD Opteron processor can increase memory throughput for increased performance. Full ECC and Chip kill can enable increased system reliability, helping to ensure your systems runs smoothly and flawlessly.
HyperTransport™ Technology	HyperTransport™ technology is designed to increase overall performance by removing I/O bottlenecks, increasing bandwidth/speed, and reducing latency, which allows glueless multiprocessing (no external logic necessary for up to 8 processors), and provides an easy building block approach to system design. Provides plenty of bandwidth for bus and I/O technologies such as PCI-X, Gigabit Ethernet, and Infiniband—increases end-user productivity.

AMD Opteron™ Processor Workstation Features & Benefits



Feature	Benefit
Architecture (Name not yet announced)	With AMD's 8 th generation processor core and new architecture, the AMD Opteron™ processors are designed to achieve an optimum balance between operating frequency and IPC, delivering next-generation performance for your current and future applications. The AMD Opteron processor features 64K instruction cache and 64K data cache for a total of 128K L1 cache and up to 1MB of integrated, on-chip, exclusive L2 cache. The L1 instruction cache includes improved advanced branch prediction. <i>(Note: The AMD Opteron processor is planned to provide 20-25% better performance than the AMD Athlon™ processor -- 20% from on-chip low latency memory controller; 5% from improvements on processor core)</i>
x86-64™ Technology	AMD's x86-64 technology brings customers a compelling 64-bit migration strategy without any significant sacrifice of existing code base. AMD's x86-64 technology is designed to: <ul style="list-style-type: none"> • Enable large memory O/S for compute intensive applications, such as DCC, CAD/CAM, EDA, database, scientific and technical modeling, etc. • Provide full speed support for x86 code base, offering high performance levels for your existing 32-bit apps • Allow a seamless 32-bit to 64-bit transition on a "Customer Need" basis • Help lower your TCO and network management complexity through a unified architecture for desktop, notebook, workstation and server, and platform flexibility
Integrated DDR Memory Controller	The integration of memory controller functionality into the processor is designed to reduce DRAM latency, and scale memory bandwidth and capacity as the number of CPUs increases – memory controller operates at processor frequency (1:1 scaling). Dual channel DDR memory interface (128-bit bus) gives up to 8.4GB/s (PC2100 DDR) or 10.8GB/s (PC2700 DDR) memory bandwidth on dual processing with AMD Opteron processors (900-pin) for increased performance and reduced task time on workstation applications.
HyperTransport™ Technology	HyperTransport technology is designed to increase overall performance by removing I/O bottlenecks, increasing bandwidth/speed, and reducing latency. For workstation users this means increased graphics throughput (up to 8x AGP), quicker loading of applications and large data sets, better multi-tasking, and smoother transition between applications
3D and Multimedia Instructions	3DNow!™ Professional technology and SSE/SSE2. The newly added SEE/SEE2 extensions enable enhanced performance on scientific/engineering modeling and 3D multi-media applications

AMD Processor Cores Roadmap



Cautionary Statement



This presentation contains forward-looking statements, which are made pursuant to the safe harbor provisions of the U.S. Private Securities Litigation Reform Act of 1995. Forward-looking statements are generally preceded by words such as "expects", "plans", "believes", "anticipates", or "intends." Investors are cautioned that all forward-looking statements in this presentation involve risks and uncertainty that could cause actual results to differ materially from current expectations. Forward-looking statements in this presentation involve the risks that the AMD Opteron™ processor will not be introduced on schedule, will not perform pursuant to its design specifications, and will not achieve customer and/or market acceptance; and that the future products in AMD's roadmap will not be introduced on schedule or at all. We urge investors to review in detail the risks and uncertainties in the company's U.S. Securities and Exchange Commission filings, including the most recently filed Form-10K.

© 2002 Advanced Micro Devices, Inc. All rights reserved.

AMD, the AMD Arrow logo, AMD Athlon, AMD Duron, AMD Opteron, AMD PowerNow!, and combinations thereof, 3DNow!, QuantiSpeed, AMD-8000, AMD-8111, AMD-8131 and AMD-8151 are trademarks of Advanced Micro Devices, Inc. HyperTransport is a trademark of the HyperTransport Technology Consortium. Other product names used in this publication are for identification purposes only and may be trademarks of their respective companies.